AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1-16. (canceled)

17. (currently amended) A multi-compartment microfluidic device for enabling fluidic isolation among interconnected compartments within the device comprising:

a substrate coupled with an optically transparent device;

said optically transparent device comprising a first microfluidic region having a first plurality of entry reservoirs for accepting or extracting a first volume of fluid;

said optically transparent device further comprising a second microfluidic region, said second microfluidic region having a second plurality of entry reservoirs for accepting or extracting a second volume of fluid that is less than said first volume of fluid to create hydrostatic pressure;

a barrier region that couples said first microfluidic region with said second microfluidic region and configured in a way to ~~that enables a biological specimen to simultaneously extend across said first microfluidic region, said barrier region and said second microfluidic region~~ allow less than a whole of a biological specimen to extend across said barrier region from at least one of said microfluidic regions; and,

said barrier region comprising a plurality of microgrooves having a width and height that enables said second volume of fluid to be fluidically isolated from said first volume of fluid via said hydrostatic pressure maintained via said at least one embedded microgroove wherein said first microfluidic region, said second microfluidic region, said first plurality of entry reservoirs, said second plurality of entry reservoirs and said barrier region are fabricated into said optically transparent device.

18. (previously presented) The multi-compartment microfluidic device of claim 17 wherein said first microfluidic region and said second microfluidic region are dispose parallel to one another and coupled with said barrier region.

19-20. (canceled)

21. (previously presented) The multi-compartment microfluidic device of claim 17 wherein said at barrier region comprises a length of not less than 50 μm.

22. (previously presented) The multi-compartment device of claim 17 wherein at least one of said plurality of microgrooves comprises dimensions less than 10 μm in height.

23. (previously presented) The multi-compartment microfluidic device of claim 17 wherein said biological specimen comprises a cellular structure.

24. (previously presented) The multi-compartment microfluidic device of claim 23 wherein said first volume of fluid is applied to a first somal domain of said cellular structure and said second volume of fluid is applied to a cytoplasmic domain of said cellular structure.

25. (previously presented) The multi-compartment microfluidic device of claim 23 wherein said cellular structure comprises nerve cells.

26. (previously presented) The multi-compartment microfluidic device of claim 25 wherein said first volume of fluid is applied to a first somal domain of said nerve cell and said second volume of fluid is applied to an neuritic region of said nerve cell.

27. (previously presented) The multi-compartment microfluidic device of claim 26 wherein said first somal domain comprises a nerve cell body.

28. (previously presented) The multi-compartment microfluidic device of claim 26 wherein said neuritic region comprises an axonal domain.

29. (canceled)

30. (previously presented) The multi-compartment microfluidic device of claim 25 wherein synapses of said nerve cell are isolated in said second microfluidic region.

31-42. (canceled)

43. (currently amended) A method for enabling fluidic isolation among interconnected compartments within a multi-compartment microfluidic device comprising:

coupling a substrate with an optically transparent device;

forming into said optically transparent device a first microfluidic region having a first plurality of entry reservoirs for accepting or extracting a first volume of fluid;

forming into said optically transparent device a second microfluidic region, said second microfluidic region having a second plurality of entry reservoirs for accepting or extracting a second volume of fluid that is less than said first volume of fluid to create hydrostatic pressure;

forming into said optically transparent device a barrier region that couples said first microfluidic region with said second microfluidic region ~~in a way that enables a biological specimen to simultaneously extend across said first microfluidic region, said barrier region and said second microfluidic region~~ and configured in a way to allow less than a whole of a biological specimen to extend across said barrier region from at least one of said microfluidic regions; and,

isolating fluidically said first volume of fluid from said second volume of fluid using said barrier region comprising a plurality of microgrooves having a width and height that enables said second volume of fluid to be fluidically isolated from said first volume of fluid via said hydrostatic pressure maintained via said at least one embedded microgroove wherein said first microfluidic region, said second microfluidic region, said first plurality of entry reservoirs, said second plurality of entry reservoirs and said barrier region are fabricated into said optically transparent device.

44. (new) A multi-compartment microfluidic device for enabling fluidic isolation among interconnected compartments within the device comprising:

a substrate coupled with an optically transparent device;

said substrate comprising a micropatterned cell-adherent coating configured to direct cell attachment;

said optically transparent device comprising a first microfluidic region having a first plurality of entry reservoirs for accepting or extracting a first volume of fluid;

said optically transparent device further comprising a second microfluidic region, said second microfluidic region having a second plurality of entry reservoirs for accepting or extracting a second volume of fluid that is less than said first volume of fluid to create hydrostatic pressure;

a barrier region that couples said first microfluidic region with said second microfluidic region in a way that enables a biological specimen to simultaneously extend across said first microfluidic region, said barrier region and said second microfluidic region; and,

said barrier region comprising a plurality of microgrooves having a width and height that enables said second volume of fluid to be fluidically isolated from said first volume of fluid via said hydrostatic pressure maintained via said at least one embedded microgroove wherein said first microfluidic region, said second microfluidic region, said first plurality of entry reservoirs, said second plurality of entry reservoirs and said barrier region are fabricated into said optically transparent device.

45. (new) The multi-compartment microfluidic device of claim 44 wherein said first microfluidic region and said second microfluidic region are dispose parallel to one another and coupled with said barrier region.

46. (new) The multi-compartment microfluidic device of claim 44 wherein said at barrier region comprises a length of not less than 50 μm.

47. (new) The multi-compartment device of claim 44 wherein at least one of said plurality of microgrooves comprises dimensions less than 10 μm in height.

48. (new) The multi-compartment microfluidic device of claim 44 wherein said biological specimen comprises a cellular structure.

49. (new) The multi-compartment microfluidic device of claim 48 wherein said first volume of fluid is applied to a cell body domain of said cellular structure and said second volume of fluid is applied to a cellular extension or outgrowth domain of said cellular structure.

50. (new) The multi-compartment microfluidic device of claim 49 wherein said cellular extension or outgrowth domain comprises pseudopod or lamellipodium.

51. (new) The multi-compartment microfluidic device of claim 48 wherein said cellular structure comprises a nerve cell.

52. (new) The multi-compartment microfluidic device of claim 51 wherein said first volume of fluid is applied to a somal domain of said nerve cell and said second volume of fluid is applied to an neuritic region of said nerve cell.

53. (new) The multi-compartment microfluidic device of claim 52 wherein said somal domain comprises a nerve cell body.

54. (new) The multi-compartment microfluidic device of claim 52 wherein said neuritic region comprises an axonal domain.

55. (new) The multi-compartment microfluidic device of claim 51 wherein synapses of said nerve cell are isolated in said second microfluidic region.

56. (new) The multi-compartment microfluidic device of claim 44 wherein said cell-adherent coating comprises any one or more selected from the group consisting of polylysine, laminin, collagen, fibronectin, integrin, polyamine, and polyornithine.

57. (new) A method for enabling fluidic isolation among interconnected compartments within a multi-compartment microfluidic device comprising:

forming a micropatterned cell-adherent coating configured to direct cell attachment onto a substrate;

coupling said substrate with an optically transparent device;

forming into said optically transparent device a first microfluidic region having a first plurality of entry reservoirs for accepting or extracting a first volume of fluid;

forming into said optically transparent device a second microfluidic region, said second microfluidic region having a second plurality of entry reservoirs for accepting or extracting a second volume of fluid that is less than said first volume of fluid to create hydrostatic pressure;

forming into said optically transparent device a barrier region that couples said first microfluidic region with said second microfluidic region in a way that enables a biological specimen to simultaneously extend across said first microfluidic region, said barrier region and said second microfluidic region; and,

isolating fluidically said first volume of fluid from said second volume of fluid using said barrier region comprising a plurality of microgrooves having a width and height that enables said second volume of fluid to be fluidically isolated from said first volume of fluid via said hydrostatic pressure maintained via said at least one embedded microgroove wherein said first microfluidic region, said second microfluidic region, said first plurality

of entry reservoirs, said second plurality of entry reservoirs and said barrier region are fabricated into said optically transparent device.